

# The Effect of Training According to Students' Learning Styles on Their Ability to Make Nursing Diagnoses: A Quasi-Experimental Study

## Öğrenme Stilllerine Yönelik Verilen Eğitimlerin Öğrencilerin Hemşirelik Tanısı Belirleyebilme Becerilerine Etkisi: Bir Yarı Deneysel Çalışma

Aslı KURTGÖZ<sup>1</sup>  
Hülya KESKİN<sup>2</sup>  
Selin KESKİN KIZILTEPE<sup>3</sup>



<sup>1</sup>Amasya University, Sabuncuoglu Serefeddin Health Services Vocational School, Department of Therapy and Rehabilitation, Amasya, Türkiye  
<sup>2</sup>Mardin Artuklu University, Health Science Faculty, Department of Audiology, Mardin, Türkiye  
<sup>3</sup>Düzce University, Health Science Faculty, Department of Nursing, Düzce, Türkiye



### ABSTRACT

**Objective:** This study was conducted to evaluate the effect of training according to students' learning styles on their ability to make nursing diagnoses.

**Methods:** The study was conducted as a one-group quasi-experimental study with pre and post-test design between April and September 2022. The research was carried out with 63 second-year students studying in the nursing department of a public university. The participants' learning styles were identified using the VARK Learning Styles Inventory. The Case Diagnosis Form (pre-test) was applied to the participants and they were asked to determine the nursing diagnoses related to the case example. They were divided into groups according to their learning styles. They were trained on the nursing diagnoses and diagnosing process according to their learning styles. Three weeks after the training, the Case Diagnosis Form was applied to them again (post-test).

**Results:** It was found that 71.4% of students had multiple learning styles, 74.6% had problems applying the nursing process, and 73% had problems determining nursing diagnoses. It was determined that the post-test mean scores of the participants increased significantly after the trainings compared to the pre-test mean scores ( $P < .001$ ). There was no difference between pre and post-test mean scores according to the descriptive characteristics of the participants ( $P > .05$ ).

**Conclusion:** The training students according to their learning styles improved their ability to make nursing diagnoses. Taking into account the learning styles of students and using different teaching strategies in their education in line with this can help improve students' ability to make nursing diagnoses.

**Keywords:** Nursing diagnosis, nursing education, nursing students, learning style

### ÖZ

**Amaç:** Bu çalışma, öğrenme stillerine yönelik verilen eğitimlerin öğrencilerin hemşirelik tanısı belirleyebilme becerilerine etkisini değerlendirmek amacıyla yapıldı.

**Yöntemler:** Araştırma, Nisan- Eylül 2022 tarihleri arasında, ön test-son test desenli tek gruplu yarı deneysel çalışma olarak yürütüldü. Araştırma bir kamu üniversitesinin hemşirelik bölümünde ikinci sınıfta öğrenim gören 63 öğrenci ile gerçekleştirildi. Katılımcıların öğrenme stilleri VARK Öğrenme Stilleri Envanteri kullanılarak belirlendi. Vaka Tanılama Formu (ön test) katılımcılara uygulanarak, vaka örneğine ilişkin hemşirelik tanıları belirlenmeleri istendi. Öğrenciler öğrenme stillerine göre gruplara ayrıldı. Katılımcılara öğrenme stillerine göre hemşirelik tanıları ve tanılama süreci hakkında eğitimler verildi. Eğitimlerden üç hafta sonra Vaka Tanılama Formu (son test) tekrar uygulandı.

**Bulgular:** Öğrencilerin %71,4'ünün çoklu öğrenme stiline sahip olduğu, %74,6'sının hemşirelik sürecinin kullanımında ve %73'ünün hemşirelik tanıları belirlemede sorun yaşadığı belirlendi. Katılımcıların eğitimler sonrasında son test puan ortalamalarının ön test puan ortalamalarına göre anlamlı düzeyde arttığı belirlendi ( $P < .001$ ). Katılımcıların tanıtıcı özelliklerine göre ön test ve son test puan ortalamaları arasında fark olmadığı saptandı ( $P > .05$ ).

**Sonuç:** Öğrenme stiline yönelik verilen eğitimlerin, öğrencilerin hemşirelik tanısı belirleme becerisini geliştirdiği saptandı. Hemşirelik öğrencilerinin öğrenme stillerinin dikkate alınması ve bu doğrultuda eğitimlerinde farklı öğretim stratejilerinin kullanılması, öğrencilerin hemşirelik tanısı belirleyebilme becerilerinin geliştirilmesine yardımcı olabilir.

**Anahtar Kelimeler:** Hemşirelik eğitimi, hemşirelik öğrencileri, hemşirelik tanıları, öğrenme stili

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Sorumlu Yazar/Corresponding author:

Aslı KURTGÖZ

E-mail: [asli.aydogan@amasya.edu.tr](mailto:asli.aydogan@amasya.edu.tr)

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## INTRODUCTION

Learning is an individual process due to differences in individual factors, perceptions, learning levels and learning styles. These differences result in each individual using different learning levels in the learning process.<sup>1,2</sup> Learning styles are among the factors that make learning easier or more difficult, that support or hinder learning.<sup>2</sup> In this context, determining students' learning styles guides the selection of strategies that facilitate the educational process and maximize learning potential.<sup>3</sup>

In fact, students with different learning styles use different ways of learning. Those with a visual learning style prefer looking at and drawing pictures, diagrams, etc., while aural learners prefer listening to information, lectures and group discussions and speaking. While learners with a read/write learning style prefer reading and taking notes, kinaesthetic learners prefer learning by experiencing and doing, simulations and practices.<sup>4,5</sup>

Nursing education should take into account the differences between students' learning styles should be taken into consideration and the teaching should be carried out in accordance with the learning style of each student. In a study conducted by Muliira et al.<sup>6</sup>, 73.2% of nursing students stated that ineffective teaching styles and methods were used in nursing education.<sup>6</sup> Education based on students' learning styles can help to train professional nurses by supporting students in the subjects they have difficulty in and facilitating their learning processes.<sup>1,7</sup> For this reason, it is crucial to use different teaching methods according to students' learning styles rather than using traditional teaching strategies and lecturing in nursing education.

The literature indicates that nursing students perceive themselves as insufficient in identifying nursing diagnoses and encounter significant challenges in this area.<sup>8, 9</sup> Diagnosis constitutes an important stage of the nursing process. At this stage, critical thinking skills should be used to evaluate patients' conditions, interpret their data, and identify their problems.<sup>10</sup> For this, it is necessary to develop critical thinking skills in addition to nursing knowledge in order for students to gain skills related to nursing diagnoses. The literature emphasizes that in order to enhance students' critical thinking, instructional tactics must be tailored to each student's preferred learning style.<sup>11</sup> In addition, it is suggested that educators should use different teaching strategies during trainings on nursing diagnosis in order to improve students' diagnostic skills.<sup>12</sup> With this study, it was aimed to obtain data on the effect of training on learning styles on students' ability to

determine nursing diagnosis. It is thought that the data obtained will contribute to the literature since no study on this subject has been encountered in the national and international literature.

## AIM

This study aimed to evaluate the effect of training according to learning styles on students' ability to make nursing diagnoses.

The following hypotheses were tested in the study;

H<sub>0</sub>: Training on learning styles has no effect on students' ability to determine nursing diagnosis.

H<sub>1</sub>: Training on learning styles increases students' ability to determine nursing diagnosis.

## METHODS

### Study Design

This study was conducted between April and September 2022 as a quasi-experimental study with one-group pre and post-test design. The research report was presented according to the Transparent Reporting of Evaluations with Nonrandomized Designs (TREND) Statement Checklist.

### Participants

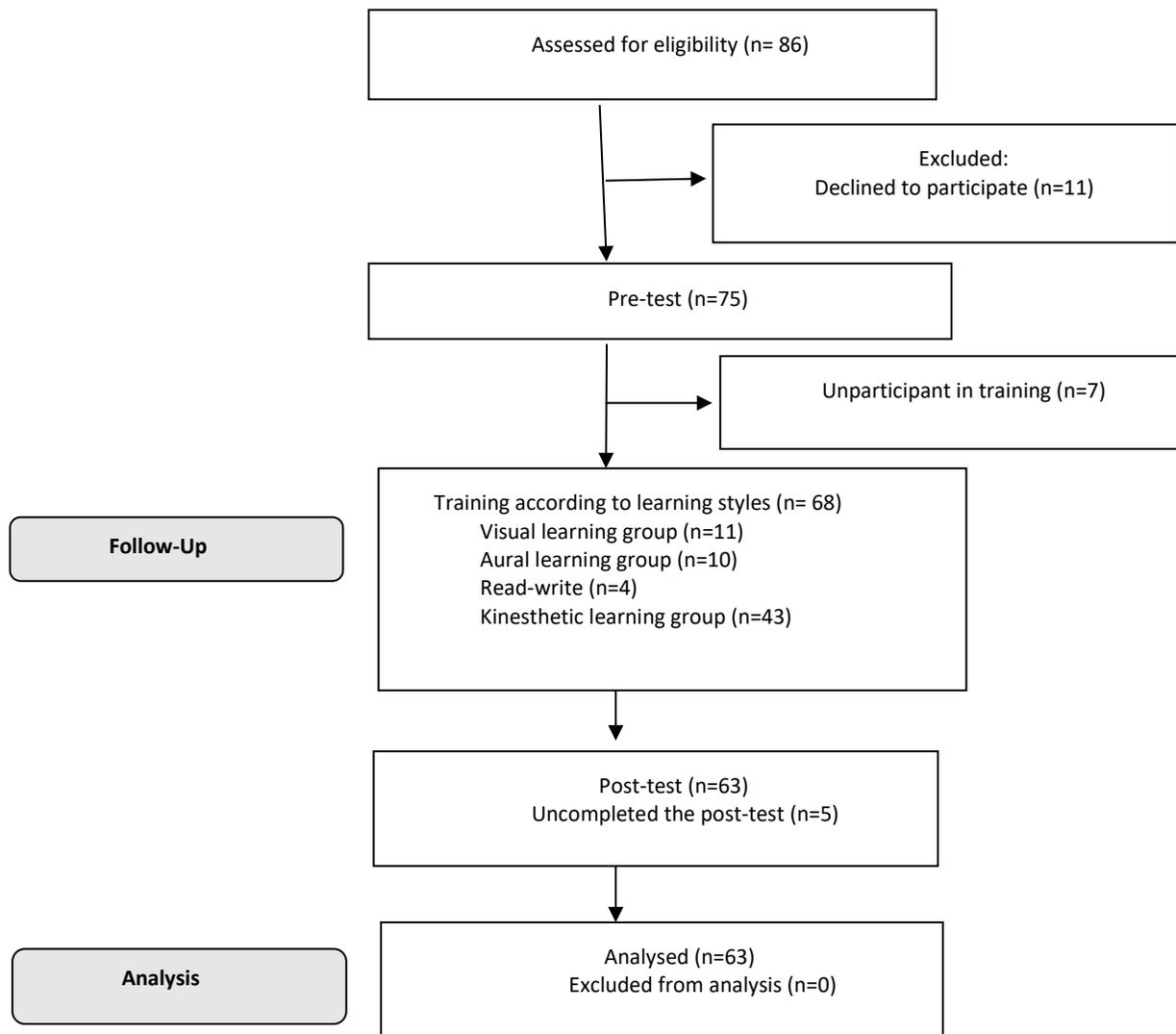
The population of the study consisted of 86 second-year nursing students in the faculty of health sciences of a state university. The inclusion criteria were defined as enrollment as a second-year student in the nursing department and voluntary agreement to participate in the study. The exclusion criteria were defined as first, third, and fourth-year students in the nursing department who had not participated in the training and had not completed the post-test. Since first-year nursing students had little knowledge about the nursing process and diagnoses, and third and fourth-year nursing students had more experience in the nursing process and care plans, our study included only second-year students in order to prevent data bias. No sample size calculation was used in the study and 75 students who volunteered to participate were included. The study was completed with 63 students, of which seven students did not participate in the training and five students did not complete the post-test (Figure 1).

### Data Collection

The data of this study were collected face-to-face using the Personal Data Form, Case Diagnosis Form, and VARK Learning Styles Inventory. We asked them to make nursing diagnoses for the case example in the Case Diagnosis Form. In addition, we used the VARK Learning Styles Inventory to identify their learning styles. Data were analyzed according to the VARK Learning Styles Inventory and determined their

learning styles. Then, the students were divided with a unimodal learning style into four groups (Visual, Aural, Read-write, and Kinesthetic) according to their learning styles. We asked students with multimodal (bimodal, trimodal, and quadmodal) learning styles which group they preferred to be in and assigned them to the relevant group. As a result, there were 11 students in the visual learning group, 10 in the aural learning group, four in the read-write group and 43 in the kinesthetic learning group (Figure 1). We determined teaching methods for the “Nursing Diagnosis” stage considering their learning styles. The presentation prepared in line with the literature was used in the training of each group by researchers.<sup>10,13-15</sup> Nursing diagnoses and the diagnosing process were explained to all students by using presentation. A training booklet on the nursing diagnosis process and NANDA-I diagnoses was

prepared for the participants in the read-write group in line with the literature.<sup>10,13-15</sup> In addition, a case example was prepared based on the literature to create concept maps for the visual learning group, case discussion for the aural learning group and simulated mannequin application for the kinesthetic learning group.<sup>10,13</sup> The case example used in the training was prepared with different characteristics than the example in the Case Diagnosis Form in order not to influence the participants and to avoid bias. After preparing appropriate training materials, each group was trained separately according to their learning styles in the classroom and laboratory by the first researcher (Table 1). Due to the large number, the kinesthetic group was divided into four small groups and training was given to each group separately.



**Figure 1.** Flow Diagram for Study

**Table 1. Training According to Learning Styles**

Learning Styles	Teaching Method	Training
V	Training presentation Concept maps	Nursing diagnoses and diagnosing process were explained to the students using a training presentation. Then, the diagnosing process was explained using concept maps with a case example.
A	Training presentation Case discussion	Nursing diagnoses and diagnosing process were explained using a training presentation. Then, a case was discussed in the classroom using a sample case.
R	Training presentation Training booklet	Nursing diagnoses and diagnosing process were explained using a training presentation. Then, students were given a training booklet prepared about the nursing diagnosis process and NANDA-I diagnoses.
K	Training presentation Manikin-based simulation application	Nursing diagnoses and diagnosing process were explained using a training presentation. Then, high- fidelity manikin-based simulation was performed in the laboratory. All parameters of the mannequin were adjusted by the researcher via an external tablet according to the characteristics of the case. The manikin was simulated according to a case example (in terms of visual symptoms, laboratory data, other symptoms, and findings). The data of the simulated manikin were evaluated, and nursing diagnoses were discussed with the students. The laboratory environment is designed like a real hospital environment and includes equipment such as patient bed, fixed oxygen unit, defibrillator, emergency trolley, etc.

V: Visual; A: Aural; R: Read-write; K: Kinesthetic

The training duration varied according to the groups and ranged between 75-180 minutes. Three weeks after the training, we reapplied the Case Diagnosis Form to the students (post-test).

#### Data Collection Tools

**Personal Data Form:** This form was prepared by the researchers in line with the literature.<sup>9, 16</sup> It consisted of nine questions regarding the sociodemographic characteristics of students (gender and age etc.) and their views on nursing diagnoses (the state of having difficulty using the nursing process, problematic area/s in using the nursing process etc.).

**Case Diagnosis Form:** This form prepared by researchers using literature.<sup>13, 15</sup> The case example in this form contains information (laboratory findings, vital signs, medical history and assessment information in accordance with Gordon's Functional Health Patterns Model) from a 54-year-old patient with liver cirrhosis who was admitted to the emergency department due to haematemesis and subsequently admitted to the general intensive care unit. The data of the case was presented in line with Gordon's Functional Health Patterns Model. NANDA-I nursing diagnoses were made by the researchers for the case example. Expert opinion was received from two academic nurses to ensure the accuracy and appropriateness of the diagnoses. The Case Diagnosis Form was revised in line with the expert opinion and 23 nursing diagnoses were made for

the case.<sup>13</sup> Participants were asked to make these diagnoses in the pre and post-test and write their nursing diagnoses for the case on the forms. To make sure that students wrote the diagnoses critically, they were asked to write their nursing diagnoses together with the risk factors/descriptive features. When each form was analyzed, diagnoses written without specifying risk factors/descriptive features were excluded and not included among the diagnoses determined by the students.

**VARK Learning Styles Inventory:** The inventory was developed by Fleming and Mills in 1992.<sup>17</sup> Its Turkish validity and reliability were performed by Düzgün<sup>18</sup>. The inventory contains 16 questions and has no sub-dimensions. Each question creates a different scenario and asks the respondent his/her preference in that situation. The answers to the questions are scored according to their Visual (V), Aural (A), Read-write (R), and Kinesthetic (K) status. The total score is obtained by summing these four components. In the visual learning style, information is usually presented through visuals, pictures or diagrams. In the aural learning style, information is acquired mainly through listening, for example by listening to lectures or participating in group discussions. The read-write learning style is a learning style in which information is usually presented in the form of written language or texts, which can be through textbooks, notes or presentations. In the kinesthetic learning style, learning takes place through activities and practices. This style includes methods such as

practical applications, scenarios or simulations. The highest score signifies a strong preference for the corresponding learning style. However, individuals may have more than one learning style. In this respect, students may have a unimodal, bimodal, or multimodal learning style.<sup>18</sup> The Cronbach's Alpha reliability coefficient of the inventory was 0.76 in the Turkish validity and reliability study by Düzgün<sup>18</sup>. However, in our study, the coefficient was found to be 0.55.

### Statistical Analysis

Data were analyzed using the Statistical Package for Social Sciences (SPSS) Version 25. Shapiro-Wilk test was used to determine the suitability for normal distribution. Independent-Samples T Test was used to compare groups in analyzing the data with normal distribution. Analysis results are expressed as a mean, standard deviation, and a frequency (percentage). Significance level was taken as .05 in the study.

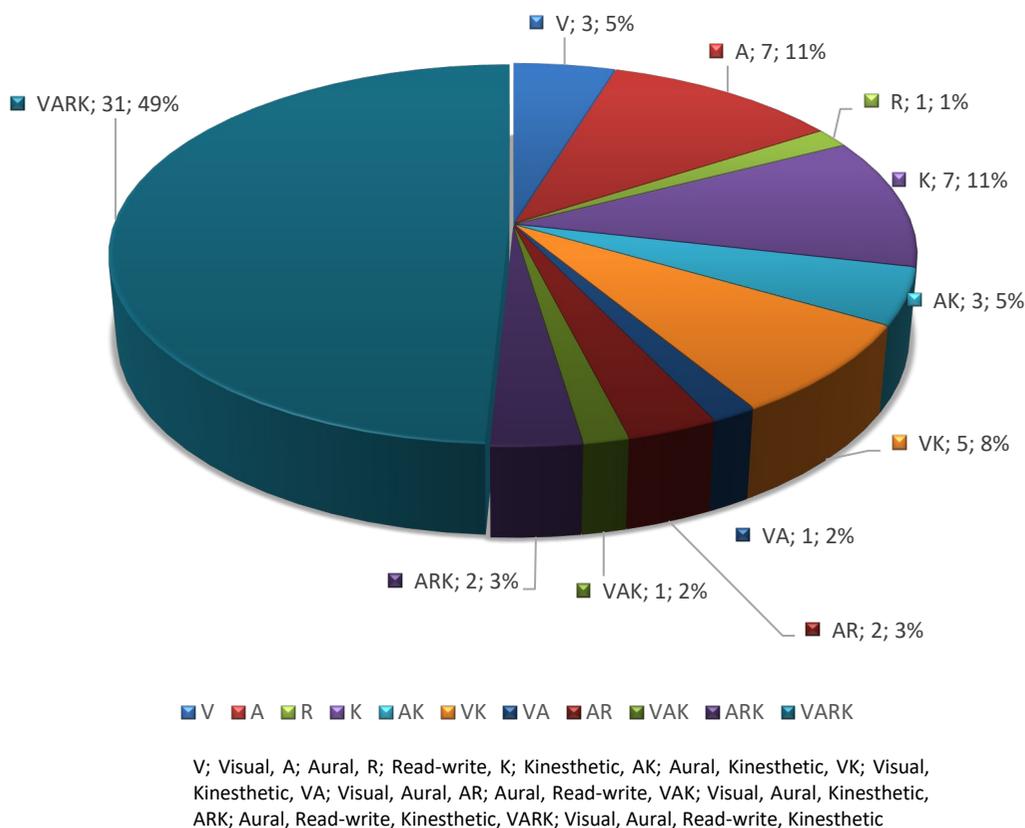
### Ethical Considerations

Before starting the study, ethics committee approval was obtained from the Amasya University Non-Interventional Clinical Research Ethics Committee (Date: 10.03.2022, No:

E-30640013-050.01.04-61748). In addition, a study permit was obtained to conduct the study at the relevant Amasya University (17.03.2022, No: E-47526769-044-62597). This study was conducted in accordance with the principles of the Helsinki Declaration. Participants were informed about the aims of the study. Informed consent was also obtained from each participant. There was no student/teacher relationship between the participants and the researchers during the research period in order to protect the participants' impartiality in giving voluntary consent.

### RESULTS

We found that 28.6% of the participants had a unimodal learning style (V: 3, A: 7, R: 1, K: 7), and 71.4% had a multimodal learning style (AK: 3, VK: 5, VA: 1, AR: 2, VAK: 1, ARK: 2, VARK: 31). We also found that 38.9% of those with a unimodal learning style had aural and kinesthetic learning styles, and 68.8% of those with a multimodal learning style had the quad modal learning style (Figure 2).



**Figure 2.** Distribution of Students According to Learning

Table 2 illustrates the sample characteristics. In our study, the mean age was 20.54±0.99 years. Of the participants, 71.4% were female. 95.2% were satisfied to study in the department of nursing. 74.6% had difficulty in using the nursing process; 39.1% of those experienced difficulty at the "diagnosing" stage, and 100% of participants considered NANDA-I nursing diagnoses necessary. We found that 73.0% of the participants had difficulty in making nursing diagnoses; 49.2% of those experienced difficulty in "naming nursing diagnoses" and 29.9% stated that the ability to make nursing diagnoses could be

developed by "making observations at the bedside during clinical practice".

Table 3 demonstrates the distribution of participants' pre and post-test answers regarding the nursing diagnoses they were expected to make in the case example. The top five most common diagnoses made in the pre-test were: Acute Pain (69.8%), Risk for Infection (65.1%), Disturbed Sleep Pattern (54.0%), Imbalanced Nutrition: Less Than Body Requirements (49.2%), Risk for Adult Falls (23.8%), and Risk for Bleeding (23.8%). None of the participants made the following diagnoses: Risk for Injury, Ineffective Health Self-Management, Acute Confusion, Risk for Situational Low Self-Esteem, Noncompliance, and Nausea (Table 3). When we evaluated the participants' mean scores from the pre-test (4.11±2.15) and post-test (12.37±3.63) according to time, we found that the post-training scores were statistically significant compared to the pre-training scores ( $t=-17.906, P<.001$ ).

It was found that there was no difference between the pre and post-test mean scores of the participants according to their gender, satisfaction to study in the department of nursing, having difficulty in using the nursing process and having difficulty in making nursing diagnoses ( $P>.05$ ) (Table 4).

## DISCUSSION

Determining the learning styles of students and taking these styles into consideration is highly important in order to create an effective learning environment.<sup>3</sup> Our study found that the majority of the students had multimodal learning styles and that the least preferred learning style was read-write while the most preferred one was kinesthetic. Other studies conducted with nursing students reported that the majority of participants were multimodal learners, and the predominant learning style was kinesthetic.<sup>19, 20</sup> Students' learning styles are a key factor that plays a major role in the problem-solving and learning processes.<sup>11</sup> Teaching methods used by structuring students' preferred learning styles can make the learning process more effective, contribute to students' positive attitudes towards learning and increase their motivation and academic performance.<sup>1,4</sup> In this regard, it is recommended to take into account that students have different learning styles in nursing education and revise an education plan accordingly.

In our study, we found that students had the most difficulty in using the nursing process at the "diagnosing" stage. However, all students considered nursing diagnoses necessary. 73% of students had difficulty in making nursing diagnoses, and 49.2% of those experienced difficulty at the

**Table 2. Sample Characteristics (n= 63)**

Characteristics	n (%)
<b>Sex</b>	
Female	45 (71.4)
Male	18 (28.6)
<b>Satisfaction to study in the department of nursing</b>	
Yes	60 (95.2)
No	3 (4.8)
<b>Has difficulty in using the nursing process</b>	
Yes	47 (74.6)
No	16 (25.4)
<b>Problematic area/s in using the nursing process*</b>	
Data collection	14 (16.1)
Diagnosing	34 (39.1)
Planning	17 (19.5)
Implementation	9 (10.3)
Assessment	13 (14.9)
<b>Considers NANDA-I nursing diagnoses necessary</b>	
Yes	63 (100.0)
No	0 (0.0)
<b>Has difficulty in making nursing diagnoses</b>	
Yes	46 (73.0)
No	17 (27.0)
<b>Problematic area/s in making nursing diagnoses*</b>	
Analysing and interpreting the collected data	21 (33.3)
Grouping the data	11 (17.5)
Naming the nursing diagnosis	31 (49.2)
<b>Methods to develop the skill of making nursing diagnoses*</b>	
Participating in theoretical courses	25 (12.7)
Watching videos about the nursing process	26 (13.2)
Studying the books related to nursing	15 (7.6)
Making observations at the bedside during clinical practice	59 (29.9)
Using computer-aided simulations	28 (14.2)
Doing case studies in the classroom	44 (22.3)

\*The respondent can give multiple answers.

**Table 3. Nursing Diagnoses Made by Students in the Pre and Post-Test**

Nursing Diagnoses		Pre-test n (%)	Post-test n (%)
Risk for adult falls	No	48 (76.2)	21 (33.3)
	Yes	15 (23.8)	42 (66.7)
Risk for injury	No	63 (100)	40 (63.5)
	Yes	0 (0.0)	23 (36.5)
Risk for infection	No	22 (34.9)	4 (6.3)
	Yes	41 (65.1)	59 (93.7)
Imbalanced nutrition: less than body requirements	No	32 (50.8)	23 (36.5)
	Yes	31 (49.2)	40 (63.5)
Excess fluid volume	No	53 (84.1)	30 (47.6)
	Yes	10 (15.9)	33 (52.4)
Risk for impaired skin integrity	No	51 (81.0)	17 (27.0)
	Yes	12 (19.0)	46 (73.0)
Ineffective breathing pattern	No	50 (79.4)	19 (30.2)
	Yes	13 (20.6)	44 (69.8)
Risk for electrolyte imbalance	No	52 (82.5)	49 (77.8)
	Yes	11 (17.5)	14 (22.2)
Disturbed sleep pattern	No	29 (46.0)	8 (12.7)
	Yes	34 (54.0)	55 (87.3)
Deficient knowledge	No	60 (95.2)	21 (33.3)
	Yes	3 (4.8)	42 (66.7)
Self-neglect	No	60 (95.2)	42 (66.7)
	Yes	3 (4.8)	21 (33.3)
Impaired physical mobility	No	54 (85.7)	23 (36.5)
	Yes	9 (14.3)	40 (63.5)
Ineffective health self-management	No	63 (100)	35 (55.6)
	Yes	0 (0.0)	28 (44.4)
Acute pain	No	19 (30.2)	10 (15.9)
	Yes	44 (69.8)	53 (84.1)
Acute confusion	No	63 (100)	39 (61.9)
	Yes	0 (0.0)	24 (38.1)
Decreased cardiac output	No	61 (96.8)	45 (71.4)
	Yes	2 (3.2)	18 (28.6)
Risk for impaired oral mucous membrane integrity	No	60 (95.2)	39 (61.9)
	Yes	3 (4.8)	24 (38.1)
Risk for situational low self-esteem	No	63 (100)	38 (60.3)
	Yes	0 (0.0)	25 (39.7)
Noncompliance	No	63 (100)	43 (68.3)
	Yes	0 (0.0)	20 (31.7)
Impaired comfort (physical)	No	62 (98.4)	37 (58.7)
	Yes	1 (1.6)	26 (41.3)
Risk for bleeding	No	48 (76.2)	28 (44.4)
	Yes	15 (23.8)	35 (55.6)
Nausea	No	63 (100)	33 (52.4)
	Yes	0 (0.0)	30 (47.6)
Fatigue	No	51 (81.0)	26 (41.3)
	Yes	12 (19.0)	37 (58.7)

**Table 4. Mean Scores from the Pre and Post-Test According to Students' Characteristics**

Characteristics		Pre-test (Mean±SD)	Post-test (Mean±SD)
<b>Sex</b>	Female	4.38±1.84	12.31±3.40
	Male	3.44±2.73	12.50±4.26
<b>Test value and P</b>		t=1.336 P=.194	t=-.185 P=.854
<b>Satisfaction to study in the department of nursing</b>	Yes	4.13±2.17	12.35±3.64
	No	3.67±2.08	12.67±4.16
<b>Test value and P</b>		t=.365 P=.717	t=-.146 P=.884
<b>Has difficulty in using the nursing process</b>	Yes	4.11±2.03	12.66±3.45
	No	4.13±2.53	11.50±4.12
<b>Test value and P</b>		t=-.030 P=.976	t=1.104 P=.274
<b>Has difficulty in making nursing diagnoses</b>	Yes	3.89±1.95	12.50±3.40
	No	4.71±2.59	12.00±4.30
<b>Test value and P</b>		t=-1.179 P=.251	t=.482 P=.632

SD: Standard Deviation, t: Independent-Samples T Test.

"naming nursing diagnoses" stage. In the study of Yildirim Keskin et al.<sup>21</sup>, it was reported that the rate of nursing students' ability to correctly determine nursing diagnoses was at a moderate level. Another study conducted with nursing students reported that participants were insufficient in terms of the distinction between nursing diagnosis and medical diagnosis and had difficulty in making NANDA-I nursing diagnoses.<sup>22</sup> In this context, it is recommended in the literature to use effective teaching methods in teaching nursing diagnoses in fundamental nursing education and to give more importance to nursing diagnoses.<sup>16</sup>

In the pre-test of our study, students often made nursing diagnoses in domains such as Nutrition, Activity/Rest, Safety/Protection, and Comfort. However, they did not make any nursing diagnoses in domains such as Health Promotion, Perception/Cognition, and Self-Perception. This finding suggests that students focused more on the physiological specialties while making their diagnoses and could not analyse the patient data in a way to provide holistic nursing care. Other studies on this subject reported that students made diagnoses in domains similar to our findings.<sup>21, 23</sup> The study by Sousa Freire et al.<sup>24</sup> also found that students made more misdiagnoses in scenarios belonging to Health Promotion and Self-Perception domains. In the post-test of our study, students were able to make diagnoses in Health Promotion, Perception/Cognition, and Self-Perception domains for the

same case example. This suggests that training according to learning styles had a positive effect on students' ability to evaluate and interpret data from a holistic perspective.

Nursing students have difficulty in the nursing process and determining nursing diagnoses correctly.<sup>16, 25</sup> Therefore, it is important for academicians to identify strategies to improve students' diagnostic skills in nursing education. Our study examined the effect of education according to learning styles on nursing students' diagnosing skills, and found that, after participants received training according to learning styles, their mean post-test scores were significantly higher than their mean pre-test scores. Our finding suggests that training according to learning styles is effective in improving the diagnosing skills of nursing students. There is no similar study finding in the literature that we can compare our study finding with. However, students' active learning methods affect their processes of receiving, processing, analyzing and structuring information and support their critical thinking skills.<sup>2</sup> In this context, it is thought that the problems experienced by students in analysing and grouping data and making accurate nursing diagnoses may be due to a nursing education that does not fit their learning styles. It can be said that students' diagnosis skills were supported with learning styles.

#### **Limitations of Study**

In our study, the sample size was limited because only second-year students were included. Due to the small

sample size and the uneven number of participants in the groups according to learning styles, our findings cannot be generalized to nursing students. Additionally, since there was no control group in the study, the pre-test and post-test comparison was made on a single group, which is a limitation of the study. And the case example contained a lot of data and participants were expected to make a large number of nursing diagnoses (23 diagnoses) for the case. In line with findings, students with multiple learning styles were included in a single education group and did not receive training for their other learning styles. Another limitation of this study is that students were not included in training for other learning styles. Expert opinions were received for the Case Diagnosis Form, but no validity and reliability studies were conducted. The fact that the students' learning styles were determined using a single measurement tool may have affected the accurate determination of learning styles. And external variables that might influence students outside of training (extracurricular individual study, clinical practice, motivation to learn, individual factors, etc.) were not taken under control may have affected the study results.

According to the findings, most of the nursing students had multimodal learning styles, and that the most preferred learning style was kinesthetic. In addition, we found that students had difficulties at the diagnosing stage and that training according to learning styles improved students' diagnostic skills. We think that taking learning styles into account is essential in solving the problems experienced by students in making accurate nursing diagnoses. In this direction, it may have a positive effect if academicians support the nursing process, especially the diagnosing stage, with various teaching methods and education according to students' learning styles.

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